An Exploration of Stress and Coping in Adults with Physical Disabilities: Are there Differences based on Home Environment?

A Thesis

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Dedication

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Abstract

With the increasing and aging population of individuals with physical disabilities, it is vital to examine factors that influence well-being. Using the lenses of the Transactional Model of Stress and Coping and the Stress Proliferation Theory, this study examined the relationship between stress levels and coping strategies based on living environment, perception of illness, pain, depression, gender, and job status. Participants were adults between the ages of 18 to 64 years old with physical disabilities who have mobility limitations. Stress and coping strategies were measured using the Health Care Stress Inventory and the Coping Response Inventory, respectively. Binomial logistic regression models found four significant interactions: 1) high pain levels predict use of active coping strategies; 2) high pain levels predict high stress; 3) depression predicts high stress; and 4) having a paid job predicts high stress. Treatment interventions should focus on the use of adaptive coping strategies that mediate stress levels, depression, pain level, and perception of illness. Policy-makers should focus on the barriers to sustainable employment, including reliable transportation, accommodating environments, and decreasing stigma and discrimination.

KEYWORDS: Active Coping, Living Environments, Physical Disability, Stress Proliferation Theory, Transactional Model of Stress and Coping

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Currently, there are over 53 million adults ages 18-64 years old living in the United States who have a physical disability. The most common functional disability, mobility-limitation, is reported by 1 in 8 adults (Centers for Disease Control and Prevention (CDC), 2015). Other frequently reported disabilities include spinal cord injury, stroke, arthritis, diabetes mellitus, obesity, muscular or neurological conditions, and multiple sclerosis (Consumer Assessment of Healthcare Providers and Systems Health Plan Survey, 2008). Individuals with physical disabilities are more likely to report symptoms of psychological distress, experiences of discrimination, inadequate financial resources and less social-emotional support than individuals without physical disabilities (CDC, 2006).

Persons with physical disabilities are significantly more likely to delay or forgo medical care than those without physical disabilities (Reichard, Stransky, Phillips, McClain, & Drum, 2017). Lack of adequate medical care often leads to the development of secondary issues which further increases stress in a population, already strained by the inherent daily challenges related to physical, social, and vocational functioning (Hanson, Neuman, & Voris, 2003). Compounding this issue is the high prevalence of depression, pain, anxiety, feelings of isolation, and hopelessness often experienced by people with physical disabilities. Home confinement, which is a frequent problem experienced by people with physical disabilities, has also been associated with depression, loneliness and comorbidity (Celeiro, Santos-del-Riego, & Garcia, 2017).

The Kaiser Foundation emphasizes that many persons with physical disabilities need assistance and support to achieve a satisfactory quality of life and the ability to participate in social and economic engagement on an equal basis with others (Hanson, et

al., 2003). Given our aging population and increased chronic illnesses associated with disability (e.g., mental illness, diabetes, cardiovascular disease), it is critical that health care professionals, family researchers, policy-makers, and others who serve this population be familiar with psychosocial and environmental factors that influence health outcomes in this population (World Health Organization (WHO), 2011).

Research makes it clear that quality of life for people with physical disabilities is related to, among other variables, the ability of the living environment to meet their physical and mental health needs (Celeiro et al., 2017; Gibson, Secker, Rolfe, Wagner, Parke, & Mistry, 2012). Homes are not merely dwelling places, but are complex sites of interactions that mediate self-identity, self-worth, worldviews, and feelings of inclusion or exclusion. Gibson et al. (2012) suggest qualities of the home environment necessary for individuals with physical disabilities to have optimal outcomes include the ability to form and maintain meaningful relationships, respectful relationships with support providers, and the ability to participate in school, work, and leisure. Two additional keys to quality of life are access to an environment that promotes self-determination in the areas deemed important by the individual and encouragement of action that determines personal outcomes, and the reciprocal exchanges of social support (Baqutayan, 2011; Ntoumanis, Edmunds, & Duda, 2009; Perez-Garcia, Olivan, & Bover, 2013; Waters, Liu, Schootman, & Jeffe, 2012).

The demand for appropriate and supportive housing for this population is also a current ongoing challenge. Research suggests that individuals influence their environment and in turn, the environment influences the individual (Gibson, et al., 2012; Lamontagne, Poncet, Careau, Sirois, & Boucher, 2013). For example, an individual who

perceives high levels of support from others will likely see home as warm and inviting while an individual who perceive low or no support from others in the home will likely see home as uncomfortable and lonely. Muenchberger and colleagues discuss that while much effort is put into developing appropriate accommodations for individuals with physical disabilities, more insight is needed into the living environment's impact on the individuals and their mental health (Muenchberger, Ehrlich, Kendall, & Vit, 2012).

Specific Aims

The goal of this study is to provide research-based evidence to aid policy-decision making and enable clinicians, family educators, and researchers to design effective services and empirically-based interventions for persons with physical disabilities and their families. The first aim is to identify the influence that living environments may have on the stress levels experienced and coping strategies used by individuals with physical disabilities. The second aim is to identify other factors that may contribute to population's stress levels experienced by this group due to perception of illness, pain level, depression, gender, and job status across different living environments and the coping strategies they employ. This study addresses a critical component of the World Health Organization's (2011) recommendations for academic institutions to conduct research on the lives of persons with physical disabilities, including the impact(s) of environmental factors on them, their quality of life, and their global well-being.

Ecology of Health

Researchers are increasingly interested in exploring the home environment and its relationship to illness and disability. Muenchberger et al. (2012) point out that home (either residential or institutional) can be positive and enabling, or a site of social

isolation, scarceness of resources, and fear that could have significant effects on health outcomes.

Importance of Home Environment

The extent to which a physical disability is disabling to the individual and family system is dependent on several interacting mechanisms, including: individual coping patterns, social support in the living environment, socioeconomic status, and perception of health (Binnema, Schrijvers, Bos, Schuurmans & Fisher, 2014; Hughes, Taylor, Robinson-Whelen, & Nosek, 2005; Kilickaya & Karakas, 2016). Lazarus (2000) points out that support in the living environment could be available or only perceived as available for the individual to experience a stress-buffering effect. Even though social support in the home environment is a major buffer of stress and a salient predictor of physical and mental health, little is known about the influence of home environments on psychosocial factors that impact the lives of adults with physical disabilities (Hill, Weston, & Jackson, 2014). Studies outlining home environments that promote physical and mental health in individuals with physical disabilities can inform housing, health, and social care policies, as well as service system reform.

Background: Variability of Home Environments

Lamontagne et al. (2013) point out that little is known about variations in stress levels and coping patterns among individuals with physical disabilities living in different environments. Current literature reports that home environments for individuals with physical disabilities are highly variable, often barely adequate in meeting basic care needs, and lacking in safety, security, self-expression, meaningful relationships, access to community and civic life, and the ability to participate in school, work, and leisure

(Dyck, Kontos, Angus, & McKeever, 2005; Gibson et al., 2012; Hill et al., 2014). Previous research examining how the living environment influences one's ability to cope with physical challenges has found conflicting results. On one hand, research shows that perceived social support predicts physical well-being, mental wellness, and cognitive functioning (Gibson et al., 2012; Hill et al., 2014). On the other hand, investigations have found that social support is not related to health or positively associated with poor health (Celeiro et al., 2017; Devereux, Bullock, Gibb, & Himler, 2015). Smith and Christakis (2008) report that one's environment including a large social network, may affect health negatively. Thus, the living environment can be a potential risk factor or source of resilience (Maisel & Gable, 2009).

Transactional Model of Stress and Coping

The effect of the living environment on the lives of persons with physical disability can be viewed using the Transactional Model of Stress and Coping (Kilickaya & Karakas, 2017; Lazarus, 2000). This model posits that stressful experiences must be conceptualized within the contexts of person-environment interactions. The transactions depend on the impact of the external stressors, the individual resources available (both real and perceived), influential characteristics of others in the home environment, and whether one lives alone or with others. Gibson et al. (2012) outlined qualities necessary to create a dignity-enabling environment, including control and flexibility of daily activities and access to opportunities for self-expression and self-identity affirmations. In the absence of dignity-enabling opportunities, individuals with physical disabilities are more likely to view their lives as unpredictable, uncontrollable, and over-loaded (Hughes et al., 2005; Livneh & Wilson, 2003; Pearlin, 2009).

History of Stress and Coping Theory

The most influential contributor to the study of coping, Richard Lazarus, defines coping as rapidly changing cognitive as well as behavioral efforts, to manage internal or external demands (Lazarus & Folkman, 1984). In 1980, the then- pioneers in the study of coping mechanisms, Lazarus and Folkman, defined two formal coping styles: problem and emotion focused coping. More recently, two broad categories of coping have been conceptualized and generally accepted: active and avoidant coping (Heutink et al., 2013; Margalit, Raviv, & Ankonina, 1992; Perez-Garcia et al., 2013). Active coping is aimed at problem solving, which includes collecting information to reassess the problem and regulation of emotion by focusing on the emotional response a stressor elicits. Passive or avoidant coping, conversely, is focused on escape from a stressor – which often leads to noncompliance with treatment recommendations and poor health outcomes (Bussing, Ostermann, Neugebauer, & Heusser, 2010; Janowski, Kurpas, Kusz, Mroczek, & Jedynak, 2014). Active coping is known to have better outcomes than avoidant or passive coping, and is associated with less pain, depression, and functional impairment, as well as higher general self-efficacy. Avoidant coping has been found to be associated with greater pain, more depression, higher functional limitations, and lower self-efficacy (Bussing et al., 2010; Fernandez-Jimenez & Arnett, 2015).

Monat and Lazarus (1991) explain that after the primary appraisal of the stressor is evaluated, a second appraisal must be done to determine if the stressor can be controlled, challenged, or is irrelevant. This second appraisal includes an assessment of the resources available to meet the stressor, which then leads to the actual strategy (coping behavior) used in the hope of returning the individual or situation to homeostasis.

However, Lazarus (2000) also says that the stress appraisal is associated with the emotional response of the individual, and will be greatly influenced by factors such as depression. This is a salient point, as it is estimated that 80% of individuals with physical disabilities also have depression. Lazarus (2000) posits that situational challenges of stressors in an individual with perceived control should lead to positive responses and problem-focused (or active) coping strategies (Kilickaya & Karakas, 2016).

Monat and Lazarus (1991) also suggest that a situational appraisal of threat accompanied by a loss of control may lead to negative emotions and emotion focused coping responses, which may do little to improve the situation. Coping strategies mediate the effects of the stress caused by demands and limitations resulting from the physical disability, but a poor fit between the individual's stress levels and coping abilities is expected to lead to poor health outcomes (Hardie, Kasima, & Pridmore, 2005; Hughes et al., 2005; Monat & Lazarus, 1991). Theories of stress and coping suggest stressful events account for a substantial proportion of the variation in physical health. However, negative health outcomes can be mediated by effective coping strategies (Lazarus & Folkman, 1984; Lesserman, 2008; Janowski et al., 2014).

Other studies exploring stress and coping found links between an adequate use of coping strategies and managing disability-related stress (Devereux et al., 2015; Ellegaard & Pedersen, 2012). For example, Binnema et al. (2014) found that individuals with hemophilia tended to use active coping strategies versus the less effective emotion-oriented coping strategies when increased social interaction and increased ability to fully participate in the activities of daily life (one form of self-efficacy) were present. In addition, several researchers have reported that using effective coping behaviors may

result in positive adjustments to stressors such as adaptation to chronic illness or functional limitations, improved physical and psychological health, and subjective well-being (Aldwin & Park, 2004; Heutink et al., 2013; Lazarus, 2000; Ntoumanis et al., 2009).

Stress Proliferation Theory

Another way to view individuals with physical disabilities and the impact of health-related stress is via the Stress Proliferation Theory (LeBlanc, Frost, & Wight, 2015; Pearlin, 2009). This theory posits that the original stressor (physical disability) can cause stress in other areas of life. For example, the physical disability may be the original stressor, but because the disability prevents the individual from participating in the workforce, poverty effects are added (Carr & Friedman 2006; Heutink et al., 2013; Ntoumanis et al., 2009). Poverty often leads to loss of reliable transportation, causing individuals to delay or forgo medical care and other aspects of their treatment plans (Reichard et al., 2017). Without adequate coping strategies, the unchecked stressors will proliferate and permeate other areas of life (Celeiro et al., 2017; Groce, Kett, Lang, & Trani, 2011).

In addition to adequate coping strategies, the effects of chronic strain from physical disabilities, unmet health needs, and lack of resources, can be reduced if the person has elevated levels of self-esteem, self-mastery, and/or social support (Baqutayan, 2011; Binnema et al, 2014; Hanson et al., 2003). However, the circumstances created by having a physical disability marked by functional limitations make it more difficult for individuals to obtain those protective features (Aldwin & Park, 2004; Binnema et al., 2014; Ntoumanis et al., 2009). For example, research shows that individuals with

physical disabilities have significantly more lifetime discriminatory events than individuals without physical disabilities, and are less likely than individuals without physical disabilities to develop a sustainable social support system (Steff, Wortman, Beales, & Cordier, 2012; Hughes et al., 2005; LeBlanc et al., 2015; Maisel & Gable, 2009; Thoits, 2010).

Importance to Families

Individuals' coping responses have implications for families as well. Family coping includes the interaction between the coping strategies of each family member. The result of the combined coping responses will enable the family to eliminate stressors, thus resolving intra-family conflicts and tension, or leave the family in state of crisis (McCubbin & Sussman, 2014).

Social Support

Lamontagne et al. (2013) state that social support can be conceptualized as the emotional, informational, or practical assistance given and received from significant others such as family, friends, or caregivers. Another definition includes the provision of psychological and material resources with the intent of benefiting the recipient. It is intended to convey love, care, esteem, and a sense of belonging (Hanson et al., 2003; Hardie et al., 2005; Hill et al., 2014; Maisel & Gable, 2009). However, social and emotional support, which are assumed to have stress-buffering effects, are often lacking for individuals with physical disabilities (Baqutayan, 2011). One study reports that there is an 11-point percentage gap in how much individuals with physical disabilities socialize with family and friends compared to individuals without disabilities (Devereux et al., 2015). Lamontagne et al. (2013) found that home environments with supportive persons

present facilitate increases in social interactions, as opposed to the homes without supportive persons. Waters et al. (2012) found high stress levels to be associated with lower social support in women with physical disabilities. However, other disabled persons have reported that family, friends, or caregivers can provide support, but often in a way that limits individual self-management (Baqutayan, 2011; Groce et al., 2011; Harris, 2014). Thus, there is no known consensus regarding when and how social support in the environment influences health outcomes.

The living environment, whether living alone, with family, friends, or formal caregivers can potentially have a positive or negative effect on the individual. Perceived support in the living environment promotes improved physical and mental health, whereas a living environment that creates fear, loneliness, or isolation, promotes poorer physical and mental health (Groce et al., 2011).

In summary, researchers have found that outcomes in persons with physical disabilities are at least partially related to psychosocial processes. Salient among the psychosocial processes that determine one's overall perception of health and ultimately quality of life are appraisal of stressors and subsequent coping strategies. Researchers have also found a relationship between living environments and people, but there is little knowledge regarding how the living environment influences mental health. Thus, to increase insight into these variables, the current research will examine the influence of the living environment on stress levels and coping strategies used by individuals with physical disabilities.

Research Questions

This study seeks to determine if individuals with physical disabilities have variations in amount of stress and subsequent coping strategies based on different living environments. This study also attempts to investigate the relationships between other factors known to influence stress and coping: perception of health status, pain, depression, gender, and job status. This investigation therefore seeks to answer the following research questions:

1. After accounting for perception of health status, pain, depression, gender and job status, is there a statistically significant difference in the probability of using active coping strategies between the subjects who live with family, friends or others, and those who live alone?
2. After accounting for perception of health status, pain, depression, gender and job status, is there a statistically significant difference in the probability of being classified as high stress between the subjects who live with family, friends or others, and those who live alone?

This study seeks to examine the following hypotheses:

H_1: Participants who live with family or other people, who report subjective perception of health status as very good or good, who report having pain, who report not having depression, who are male, and who have a paid job in the community will have a higher probability of using active coping strategies than their respective counterparts.

H_2: Participants who live alone, who report subjective health status as fair or poor, who report having pain, who report being depressed, who are female,

and who have a paid job in the community will have a higher probability of being classified as high stress than their respective counterparts.

Method

Source of Data

This study was based on a subset of data from the Minnesota Health Care Coordination Study (HCC), which was funded by the National Institute of Disability and Rehabilitation of the U.S. Department of Education, under grant H133A0800-49, Abery, principal investigator. The HCC is a purposive sample recruited by the five Managed Care Organizations (MCO) that deliver Minnesota's Special Needs Basic Care Program (SNBC). The SNBC program is a voluntary managed care plan primarily for Medicaid-only beneficiaries with mental and/or physical disabilities. Researchers at the Universities of Minnesota's Institute of Community Integration (ICI) developed the five-year longitudinal study to determine the critical elements of health care coordination for individuals with physical disabilities. Year One data is included in this study (N = 214). Criteria for the HCC study was diagnoses of physical disability and actively working with a care coordinator from one of the five MCOs. Exclusion criteria included not knowing care coordinators name and denial of functional limitations.

Participants

Adults (N = 214) age 18-64 years old with physical disabilities enrolled in a public managed care program. Examination of Minnesota's MMIS data revealed that more than 80% of the enrolled SNBC recipients reporting physical disability also have one or more mental health diagnoses. In addition, 47.9% have received chemical addiction treatment, while 32.6% report intellectual or developmental disabilities. Table 1 shows participant

demographic characteristics.

Study Design

The current study investigates the probability of participants being classified as high stress or likely to use active coping strategies based on their living arrangements. The HCC study is cross-sectional with a purposive sample: individuals with physical disabilities enrolled in the SNBC program of one of the five major HMO's in Minnesota. The input of numerous stakeholder groups, including people with physical disabilities, was used to develop the conceptual framework for care coordination employed for the original study via the Participatory Planning and Decision Making (PPDM; Lewis & Johnson, 2000) process, thus maximizing best fit between the applied research and the intended intervention recipients receive. The HCC researchers met with the participants in their homes or a public venue and administered the two-hour survey, which focused on care coordination experiences and outcomes for persons with physical disabilities regarding access to care, health outcomes, and impact of cost of health care. For some participants, administration of the survey was undertaken in two visits as pain or other disability-related factors prevented completion in the allotted two hours. Participants were given a $30 gift card to Target upon completion of the survey. The interviews were conducted by trained interviewers with a background in child or educational psychology, social work, or the health care professions.

Measures

Dependent variables.

***Coping inventory*.** The *Coping Response Inventory* is an 18- item instrument adapted for the HCC study from the original *Coping Responses Inventory*, a 48-item

instrument that measures eight distinct categories of coping responses to stressful life circumstances (Moos, 1992). Participants are asked to think about how their physical disability has impacted their lives over the past six months and then choose an answer choice indicating the actions taken to resolve the issue.

Active coping is represented by four types of responses included in the 18-item set (logical analysis, positive reappraisal, seeking guidance, and support problem solving). It is comprised of actions that will more likely lead to obviation of problems or the reframing of issues which leads to psychological relief. Items include "I live one day or step at a time" and "I often talk to friends when I have a problem." Internal consistency reliability for the four types of coping response is between .62 to .74 for men, .58 and .71 for women. These values are consistent with previous studies utilizing coping scales including the *Adaptive Coping with Disease* Scale, designed to identify adaptive coping styles, Cronbach's alpha = 0.867 and the *Coping Inventory for Stressful Situations*, designed to measure three styles of coping with stress, Cronbach's Alpha ranging from 0.78 to 0.90 for individual subscales (Bussing et al., 2010; Janowski et al., 2014). Participants were given four answer choice options where 4 = often, 3 = sometimes, 2 = rarely and 1 = never. These variables were collapsed into a dichotomous variable where 1 = never was combined with 2 = rarely to capture low active coping and 3 = sometimes was combined with 4 = always to capture high active coping. (See Appendix A).

Health care stress. Stress was measured by the *Disability and Chronic Illness-related Stress Inventory (DCIRSI*) (Leung, Lue, Tang, & Wu, 1999). This 24-item scale assessed the degree to which an individual's physical disability and disability-related

factors create stress. Items included, "I am worried that my health care or treatment needs will force me to quit my job, volunteer work, and/or regularly scheduled events, or make me reduce my hours," and "I worry because I don't have people to support me in completing the paperwork I need to complete to get the benefits I need." Analysis suggests adequate validity for the scale and a 5-factor structure with a high level of internal consistency among scale items (Cronbach alpha = .94/.90). These values are consistent with previous studies utilizing this scale including the *Perceived Stress Scale*, alpha = 0.78 (Cohen & Williamson, 1988), which asks respondents to evaluate the extent to which they find their lives stressful. Participants were given the following four answer choice options: 4 = often, 3 = sometimes, 2 = rarely and 1 = never. These variables were then recoded into a dichotomous variable where 1 = never was combined with 2 = rarely to capture low stress and 3 = sometimes was combined with 4 = always to capture high stress (See Appendix B).

Independent variables.

Living environment. The participants were divided into three groups: living with family, living with others, and living alone. Criteria for living with family were residing with spouse or significant other, parents, children, or other relatives. Criteria for living with others were residing with friends, in a group home, or congregate housing. Criteria for living alone was residing with no other persons. To compute statistical analyses this variable was coded as living alone = 0 (n = 113), living with families = 1 (n = 66), and living with others = 2 (n = 26).

The Healthy Days Measure. The Healthy Days Measure *(*Modified) (CDC, 2006; 2015) measures subjective perception of health and the impact it has on daily living. Four

questions comprise the CDC Healthy Days Measure and are acknowledged as a standard for population health surveillance by national and international groups. The purpose of the Healthy Days Measure is to identify unmet health needs as well as recognize trends, disparities and determinants of health in individuals with physical disabilities (CDC, 2006; 2015). Two measurements from the Healthy Days Measure, perception of health status and pain were used in this study.

Perception of health status. Participants were asked the following question to determine perception of health status: "Would you say that in general your health is poor, fair, good, or very good?"

Ziarko, Mojs, Piasecki, & Samborski (2014) determined in a cohort of individuals with rheumatoid arthritis that perception of illness predicted subsequent health behaviors, social participation and roles, and return to employment. In addition, Bussing et al. (2010) found that positive interpretations of illness, such as value and challenge, correlated, although weakly, with adaptive coping strategies. Dysfunctional coping strategies, however, have been found to mediate the relationship between subjective health status and level of depression (Ziarko et al., 2014).

Pain. Participants were asked the following question to determine the impact of pain on completing daily activities: During the past 30 days, how many days did pain make it hard for you to do your usual activities, such as self-care, work, or recreation? This variable was coded as continuous ranging from zero to 30 days.

Depression. Participants were asked if they had depression. The answer choices were yes or no. Depression was coded as a dummy variable where 0 = No and 1=Yes.

Gender. Gender was included as a covariate and was coded as a dummy variable where 0 = males and 1= females.

Job Status. Job status was included as a covariate and was coded as a dummy variable where 0 = no job and 1 = has paid job in community setting.

Missing Data and Data Manipulation

If the participants answered, "I do not know," "Not Applicable," did not answer, or the answer was unintelligible, they were set to missing. The researcher also set the one individual with a DK (do not know) for gender as missing. There were 18 coping questions and 24 stress questions. Only questions that were answered with responses of "often," "sometimes," "rarely," or "never" were considered valid answers. For example, if a person answered only 15 of the 18 questions on the coping inventory, and had 10 high and 5 low answers, a percentage high would be 10/15 (not 10/18).

Data Analyses

Binomial logistic regression was used to conduct the statistical analyses. Binomial logistic regression is often used in social science research when the analyses must predict an outcome measure that is dichotomous (LeBlanc et al., 2015). Binomial logistic regression performs two functions: prediction of group membership and the knowledge of the relationships and strengths among the predictor variables that may contribute to variations in the dependent variables. Binomial logistic regression does not predict a numerical value, thus the usual least squares deviations criteria for best-fit approach of minimizing error around the line of best fit is inappropriate. Thus, binomial logistic regression employs binomial probability theory in which there are only two values to predict: the probability that an event or person belongs to one group rather than the other.

The results are presented as an odds ratio; the ratio of the probability of being in one of the two categories high active coping or low active coping (Model 1) and high stress or low stress (Model 2) vs. not being in one of the two categories (Burns & Burns, 2008).

To identify differences in the probability of using active coping strategies vs. not using active coping strategies based on living environment, a binomial regression with one variable, living situation was examined. The three possible living situations examined in this study are living with family, living with others, or living alone. Then, a binomial regression was conducted to assess whether the presence of the other predictor variables (perception of health status, pain, depression, gender, and job status) influenced the probability of answering high active coping strategies vs. low use of active coping strategies across the living situations.

Second, to identify differences in the probability of being classified as high stress vs. low stress based on living environment, a binomial regression with only one variable, living situation, was examined. The three living situations are living with family, living with others, or living alone. Then, a binomial logistic regression was conducted to assess whether the presence of other variables of interest (perception of health status, pain, depression, gender, and job status) influences the probability of having high stress across the living situations. Alpha level was set to 0.05 with confidence levels at 95%. To decrease probability of a Type 1 error (false positive), the alpha was set at 0.05 as an alpha of 0.10 allows for greater chance to incorrectly reject the null hypothesis, whereas an alpha level of 0.01 would allow for possibility of not rejecting the null hypothesis when it should be rejected. An alpha level of 0.05 is a good balance between those issues and common to researchers, thus results may be more relatable. The assumption that

observations were independent, as well as large sample size is met by study design. The assumption of linear relationship between variables was met by using the quasi-binomial family in models to account for over dispersion. All statistical analyses were performed using R version 3.2.3.

Results

Model 1

Two analyses were performed for Model 1. First, to answer research question one, a binomial logistic regression with living situation as the only covariate was conducted to examine whether persons with physical disabilities who lived with family or others would be more likely to utilize active coping strategies than persons with physical disabilities who lived alone. Secondly, to test Hypothesis One, a binomial logistic regression was conducted to assess whether the three types of living environments (living with family, living with others, living alone), along with the five predictor variables (perception of health status, pain, depression, gender, and job status) significantly predicted the probability that an individual utilized a high number of active coping strategies. By design, the observations were independent and quasi-binomial family was used to account for over dispersion.

Research Question 1.

When only living environment was considered, there was no significant effect of living with family ($\beta = 0.058$, $t = 0.285$, $p = 0.776$) or living with others ($\beta = 0.064$, $t = 0.230$, $p = 0.891$) in relation of being classified as using high number of active coping strategies.

When the predictor variables were considered (along with living environment),

there was still no effect of being classified as using high number of active coping strategies based on living with family (β = 0.213, t = 0.877, p = 0.382) or living with others (β = 0.471, t = 1.411, p = 0.160).

Hypothesis 1. Partially supported.

Perception of health status. When the predictor variables were considered (along with living environment) perception of health status as good (β = -0.251, t = -0.883, p = 0.379) or very good (β = 0.550, t = 1.201, p = 0.231) was not significant in explaining the probability of being classified as using high number of active coping strategies.

Pain. When the predictor variables were considered (along with living environment), pain (β = 0.026, t = 2.719, p = 0.007) was significant in explaining the probability of being classified as using high number of active coping strategies. For every unit increase in pain, the log odds of using active coping strategies increased by 0.026, or 26%. Figure 1 shows the positive relationship between pain and the probability of using a high number of active coping strategies.

Depression. When the predictor variables were considered (along with living environment), depression (β = 0.019, t = 0.083, p = 0.934) was not significant in explaining the probability of being classified as using high number of active coping strategies.

Gender. When the predictor variables were considered (along with living environment), gender (β = 0.139, t = 0.657, p = 0.512) was not significant in explaining the probability of being classified as using high number of active coping strategies.

Job status. When the predictor variables were considered (along with living environment), job status (β = -0.289, t = -1.008, p = 0.315) was not significant in

explaining the probability of being classified as using high number of active coping strategies.

Table 2 presents summary of binomial logistic regression analysis for Model 1 predicting the probability of being classified as utilizing a high number of active coping strategies based on living environment and the predictor variables (perception of health status, pain, depression, gender, and job status).

Model 2

Two statistical analyses were conducted for Model 2. First, to answer research question two, a binomial logistic regression with living situation as the only covariate was conducted to examine whether persons with physical disabilities who lived with alone would be more likely to be classified as high stress than persons with physical disabilities who lived with family or others. Secondly, to answer Hypothesis Two, a binomial logistic regression was conducted to assess whether the three types of living environment, along with the five predictor variables (perception of health status, pain, depression, gender, job status) significantly predicted the participant would be classified as high stress.

Research Question 2.

When only living environment was considered, there was no significant effect of living with family ($\beta = 0.201$, $t = 0.980$, $p = 0.328$) or living with others ($\beta = -0.029$, $t = -0.099$, $p = 0.921$) in relation to being classified as high stress.

When the predictor variables were considered (along with living situation), there was still no effect of being classified as high stress based on living with family ($\beta=0.033$, $t=0.144$, $p = 0.886$) or living with others ($\beta = 0.352$, $t = 1.047$, $p = 0.297$).

Hypothesis 2. Partially supported.

Perception of health status. When the predictor variables were considered (along with living situation), perception of health status as fair ($\beta = 0.143$, $t = 0.583$, $p = 0.561$), good ($\beta = -0.204$, $t = -0.668$, $p = 0.505$) or very good ($\beta = -0.459$, $t = -0.985$, $p = 0.326$) were not significant in predicting the probability of being classified as high stress.

Pain. When the predictor variables were considered (along with living situation), pain ($\beta = 0.029$, $t = 2.946$, $p = 0.004$) was significant in predicting probability of being classified as high stress. Thus, for every unit increase in pain, the log odds of being classified as high stress increased by 0.029, or 29%. Figure 2 shows the relationship between pain and high stress.

Depression. When the predictor variables were considered (along with living situation), depression ($\beta = 0.925$, $t = 3.599$, $p = 0.000$) was significant in predicting probability of being classified as high stress. Thus, for every unit increase in depression, the log odds of being classified as high stress increased by 0.925, or 92%. Figure 3 shows the relationship between depression and high stress.

Gender. When the predictor variables were considered (along with living situation), being female ($\beta = 0.165$, $t = 0.748$, $p = 0.455$) was not significant in predicting probability of being classified as high stress.

Job Status. When the predictor variables were considered (along with living situation), having a paid job in the community ($\beta = 0.716$, $t = 2.294$, $p = 0.023$) was significant in predicting probability of being classified as high stress. Thus, for every unit increase in having a paid job in the community, the log odds of being classified as high stress increased by 0.716, or 71%. Figure 4 shows the relationship between having a paid

job in the community and high stress.

Discussion

Using the framework of the Transactional Model of Stress and Coping (Lazarus, 2000), the present study hypothesized that persons with physical disabilities who live with family or others would be more likely to use active coping strategies and report lower stress than those who lived alone. Previous studies on the relationship between social support and coping strategies of persons with physical disabilities suggest that a supportive social environment should empower individuals to appraise stressful situations in a more positive light, leading to adaptive coping strategies, resulting in a better quality of life, mental health, and illness remission (Baqutayan, 2011; Ntoumanis et al., 2009; Thoits, 2010). This hypothesis was based on the premise that individuals living with social support would experience a buffering effect from stress, thus decreasing negative health outcomes (Hill et al., 2014; Lamontagne et al., 2013; Livneh & Antonak, 2005). However, little support was obtained for the hypotheses that active coping strategies and stress levels were associated with living environment. These unexpected results can be interpreted in several ways. It may be that there truly is no relationship between the use of active coping strategies, stress levels, and living environments. Alternately, it may be that the present study's design was not sensitive enough to identify the association. Another possibility is that an uncontrolled variable is confounding these results.

The Transactional Model of Stress and Coping assumes that the stressful experience is construed because of the person-environment interactions, and that stress can be mediated by the actual and perceived social resources available to the individual (Baqutayan, 2011; Hughes et al., 2005). However, living with family or others does not

necessarily equate to social support. Some social environments offer support in a nonjudgmental way, thus promoting autonomy, dignity, and feelings of belonging for the individual. Other social environments, conversely, are coercive, critical, and offer only conditional regard (Ntoumanis et al., 2009). Thus, future research should include a measure of social support. The quality of support, either dignity-enabling or dignity-disabling, is likely to influence psychosocial processes in the individual (Gibson et al., 2012).

In addition, this study also examined other variables that have been found to be associated with coping strategies and stress levels in persons with physical disabilities. This study hypothesized that people with physical disabilities who were male and reported perception of health as good or very good, high pain, presence of depression, and having a paid job in the community would be more likely to use active coping strategies than those who were female and reported health status as fair or poor, low or no pain, absence of depression, and no paid job in the community. Results support the hypothesis that pain predicts using active coping strategies, which is consistent with other research findings (Bussing et al., 2010; Heutink et al., 2012). Bussing et al. (2010) report that individuals with physical disabilities who experience chronic pain used active coping strategies, including both internal and external sources, to control their pain. Internal sources included choosing healthy ways of living and having a positive attitude, whereas external sources include seeking medical help and information.

These results are important as active coping is associated with less pain, less depression, and less functional limitations, whereas passive coping (such as avoidance or escape) is associated with greater pain, greater depression, and greater functional

limitation (Bussing et al., 201; Ellegaard & Pedersen, 2012; Heutink et al., 2013; Ziarko et al., 2014). A major task in patient care is to restore a sense of self-control over pain (Persson & Ryden, 2006). These results support the body of literature suggesting that along with pain management; interventions should be formulated and disseminated to bring awareness of active coping strategies (Bussing et al., 2010; Heutink et al., 2013; Hughes et al., 005; Ziarko et al., 2014).

This study also predicted that people with physical disabilities who were female and reported perception of health as fair or poor, high pain, presence of depression, and having a paid job in the community would be more likely to be classified as high stress than those individuals who were male and reported health status as good or fair, low or no pain, absence of depression, and not having a paid job in the community. The results support the hypotheses that pain, depression, and having a paid job in the community are associated with high stress levels. These results are supported by and contribute to other reaching findings documenting the relationship between pain, depression, and job stress in individuals with physical disabilities (e.g., Ellegaard & Pedersen, 2012; Wallace, McDougle, Miser, & Haddox, 2014; Harris, 2014). These researchers have found that chronic pain permeates all domains of life; causing decreased mobility and functionality, withdrawal from social activities, decreased ability to perform work, and financial insecurity. Ellegaard and Pedersen (2012) found that individuals with reduced functioning because of chronic pain experienced feelings of powerlessness, decreased self-worth, and anxiety, which in turn led to depression. Research has also shown that pain coping strategies such as passive coping strategies (escape or denial) are predictors of pain intensity and pain-related disabilities (Heutink et al., 2013; Janowski et al., 2014).

Thus, considering the association between pain and stress and the pervasiveness of pain among individuals with physical disabilities, it will be useful to create interventions that modify pain coping strategies to promote a sense of empowerment, confidence, and increased social support (Bussing et al., 2010; Heutink et al., 2013; Livneh & Wilson, 2003). These findings, along with pain being a predictor of high stress, are in line with other research studies and can be explained via the Stress Proliferation Theory (Ellegaard & Pedersen, 2012; Pearlin, 2009; Wallace et al., 2014). Thoits (2010) explains how the pile-up of stressors causes stress to proliferate: Physical disability (the original stressor) causes chronic pain (the secondary stressor), which leads to depression (additional stressor), which is compounded by employment stress (additional stressor). The combination of pain and depression is often expressed as stress-related symptoms, including restrictions in daily life, powerlessness, anger, and social withdrawal (Ellegaard & Pedersen, 2012; Groce et al., 2011). Future studies should determine original diagnoses: Did disability-related stress (e.g., pain, low income) factors cause the depression, or was depression present at baseline? Determining etiology of depression will assist in developing treatment goals.

The current study results support the hypothesis that individuals with physical disabilities who have a paid job in the community will be more likely to report high stress versus individuals who do not have a paid job in the community. These results are possibly due to the barriers that often prevent individuals with physical disabilities from obtaining or sustaining employment, such as an accessible work environment, reliable transportation, and management of disability-related health care factors (Reichard et al., 2017). It is important to note that the job status measure did not consider whether the

individual was fulfilled in their job, or if they even liked it. In addition, individuals with physical disabilities are more likely to be unemployed or underemployed than individuals without physical disabilities (WHO, 2011). The current study adds power to Reichard et al.'s (2017) findings in that 15% of the participants in the current study reported having a paid job in a community setting, but 30% of those employed reported worrying that meeting their health care needs would interfere with their ability to remain employed.

This study did not find significant association between gender or reported health status and coping strategies or stress levels. Other studies, however, have found a relationship between perception of health status and coping strategies (e.g., Bussing et al., 2010). For example, Ziarko et al. (2014) found that dysfunctional coping strategies mediated the relationship between beliefs about one's illness and depression. Also, Kilickaya and Karakas (2016) found that a perception of one's health status as negative predicted increased loneliness and decreased the ability to use effective coping strategies in individuals with chronic illness. In addition, a positive perception of health status has been found to be associated with adaptive coping strategies, which decrease stress, and increase life satisfaction (Fernandez-Jimenez & Arnett, 2015). Bussing et al. (2010) state that individuals with physical disabilities and other chronic health conditions must find a way to maintain spiritual, emotional, and physical health despite the challenges inherent to these conditions. They have found associations between internal adaptive coping strategies and positive interpretation of health. Internal coping strategies include conscience ways of living, positive attitudes, trust in divine help, and reappraisal. Reappraisal is of importance in the interpretation of health status; it reframes individuals' conditions as opportunities, a hint to change life, and promotes the reflection upon the

essentials of life. The cognitive restructuring caused by reflection may lead to changing goals, changes in attitude and behavior, and avenues for personal growth. Thus, clinicians should assist patients to incorporate this cognitive behavioral strategy; it can cause significant changes in overall satisfaction and quality of life (Bussing et al., 2010; Livneh & Antonak, 2005; Perez-Garcia et al., 2014).

The current study did not find a link between gender and coping strategies or stress levels. Researchers claim that men with physical disabilities are more likely to use more effective coping strategies than women with physical disabilities; in part, because women who have physical disabilities are more marginalized and report higher lifetime discriminatory events than their male counterparts (Hanson et al., 2003; Hughes et al., 2005; LeBlanc et al., 2015). These unexpected results may be because the inherent challenges of physical disabilities that limit functional mobility may supersede any differences in gender.

These findings have important policy indications, as explained in the Global Thematic Consultation on marginalized persons in our society. Since 1999 there has been a shift in understanding disability among policymakers, due to a growing body of research showing that the most pressing problems faced by individuals with physical disabilities is not functional or other limitations, but poverty, exclusion, and marginalization caused by stigma and prejudice (Groce et al., 2011, Steff et al., 2012). Clinically, disability rehabilitation should include interventions to increase education, training, or job skills that will allow for sustainable employment.

Study Strengths and Limitations

This study is possibly the first to explore stress levels and coping strategies in

individuals with physical disabilities across different living situations. It meets important recommendations of the World Health Organization (2011): creating dignity-enabling environments by gathering and disseminating research-based evidence to influence existing treatment standards and current legislation, thereby benefitting people with physical disabilities. Also, this study meets important objectives of Healthy People 2020, which aims to improve social and environmental living conditions among individuals with disabilities by collecting and disseminating research that address health care and social inequalities for people with physical disabilities (Healthy People 2020, 2017). Finally, this study has conceptual implications by adding to the growing body of scholarship on spatial dimensions and health and the many ways that the home environment is integral to the experience of disability (Devereux et al., 2015; Dyck et al., 2005; Gibson et al., 2012)

Even though this study has many strengths, limits of generalizability should be mentioned. This study used a non-random, purposive sample of voluntary participants who belonged to one of Minnesota's five managed health care programs. All participants were part of a State of Minnesota Pilot program and were assigned a care coordinator; thus, the findings may be confounded by the interactions participants had with their health care coordinators. Also, the sample may be unique in that each participant had to voluntarily participate in the health care coordinator pilot program. Also, the quality of perceived social support by the participants was not measured or included. Thus, there may be variations in stress and coping strategies among the three living environments that were not detected. (Hill et al., 2014; Lamontagne et al., 2013).

Future Research

There are gaps in the literature that need to be addressed. First, due to low levels of social support in people with physical disabilities, it will be important to identify factors that are associated with social support as it plays a role in health outcomes for this population (Baqutayan, 2011). Second, to increase validity of results the measurement of social support should be tailored to individuals with physical disabilities, as their experiences are different from individuals without physical disabilities (WHO, 2011). Third, studies underscored by theory which focus on the relationship between place and health, should capture not only place-level and individual-level factors, but a relational view, as the person-environment relationship is reciprocal in nature. Lastly, qualitative research is needed to understand the use of coping strategies, aiding in the design and implementation of policy and programs intended to increase mental and physical health status in individuals with physical disabilities.

Policy and Clinical Implications

Research findings from studies who utilize individuals with physical disabilities throughout the research process can have major impacts on policy and clinical practice. Specifically, this datum can be used to decrease the health impacts of difficulties experienced by this population. Community agencies, health care professionals, caregivers, employers, and researchers can determine best practices and disseminate interventions that mediate the effects of stress and bolster effective coping mechanisms. In addition, to decrease health inequalities, the structural conditions that promote discrimination, poverty, and low employment rates can be addressed through the creation of prevention programs.

Conclusion

This study employed the lenses of the Stress Proliferation Theory and the Transactional Model of Stress and Coping to examine the association between living environments and their influence on stress and coping strategies in individuals with physical disabilities. Although no difference was found between living environment and the probability of being high stress or using active coping strategies, this study did identify that pain, depression, and job status were predictors of high stress, while pain was also a predictor of the utilization of active coping strategies. Thus, future studies should further evaluate the role of living environment as a predictor of stress and subsequent coping strategies by identifying possible confounding variables, such as the perception of available social support. As the population of people with physical disability ages, it will be imperative to identify which living situations offer the best outcomes for this marginalized population.

Table 1

Characteristics of Participants (N = 214)

Characteristic	%
Age (in years)	
18-24	.9
25-34	4.7
35-44	14.0
45-54	37.9
55-64	33.2
65-74	0.5
Gender	
Male	31.3
Female	67.5
Race	
White	58.6
Black/AA	35.9
Hawaiian/PI	1.0
AI/AN	2.5
Latino	1.0
Other	1.0
Years of School Completed	
Grades 1-11	13.0
12th No diploma	7.2
HS grad/GED	24.2
HS transition program	2.9
Trade/2 yr. degree	18.4
Some college	20.8
College graduate	9.2
Master's degree	3.9
Doctorate degree	0.5
Paid Job	
No	84.6
Yes	15.4
Living Situation	
Spouse or sig other	19.0
Parents	2.9
Other relatives	10.2
Friends	2.0
Group Home	6.3
Congregate housing	4.4
On own	55.1

Table 2

Summary of Logistic Regression Analysis Predicting use of Active Coping Skills

Variable	*B*	*SE*	*OR*	*OR 95% CI*	*t-value*	*p*
Living with Family	0.213	0.242	1.237	[0.78, 4.37]	0.877	0.382
Living with Others	0.471	0.334	1.602	[0.85, 3.17]	1.411	0.160
Perception of Health Status (Fair)	0.297	0.269	1.345	[0.79, 2.28]	1.103	0.272
Perception of Health Status (Good)	-0.251	0.285	0.779	[0.44, 1.36]	-0.883	0.379
Perception of Health Status (Very Good)	0.559	0.465	1.749	[0.74, 4.67]	1.201	0.232
Pain	0.026	0.009	1.027	[1.01, 1.05]	2.719	0.007**
Depression	0.019	0.229	1.019	[0.65, 1.6]	0.083	0.934
Gender	0.139	0.212	1.149	[0.76, 1.73]	0.657	0.512
Job Status	-0.289	0.287	0.749	[0.43, 1.33]	-1.008	0.315

Note. CI = interval for odds ratio (OR). Reference level = Living Alone, Poor Health, Low Pain, No Depression, Male, No Job

*** p < .01*

Table 3

Summary of Logistic Regression Analysis Predicting High Stress

Variable	*B*	*SE*	*OR*	*OR 95% CI*	*t-value*	*p*
Living with Family	0.033	0.229	1.034	[0.65, 1.61]	0.144	0.886
Living with Others	0.352	0.336	1.422	[0.72, 2.72]	1.047	0.297
Perception of Health Status (Fair)	0.143	0.246	1.154	[0.71, 1.87]	0.583	0.561
Perception of Health Status (Good)						
Perception of Health status (Very Good)						
	-0.204	0.306	0.815	[0.44, 1.48]	-0.668	0.505
	-0.459	0.467	0.631	[0.24, 1.50]	-0.985	0.326
Pain	0.029	0.009	1.029	[1.01, 1.05]	2.946	0.003**
Depression	0.925	0.257	2.522	[1.54, 4.24]	3.599	0.000***
Gender	0.164	0.220	1.179	[0.77, 1.83]	0.749	0.455
Job Status	0.716	0.312	2.047	[1.10, 3.77]	0.312	0.023*

Note. CI = interval for odds ratio (OR). Reference level = Living Alone, Poor Health, Low Pain, No Depression, Male, No Job

* *p* = < .05

** *p* =< .01

*** *p* = < .001

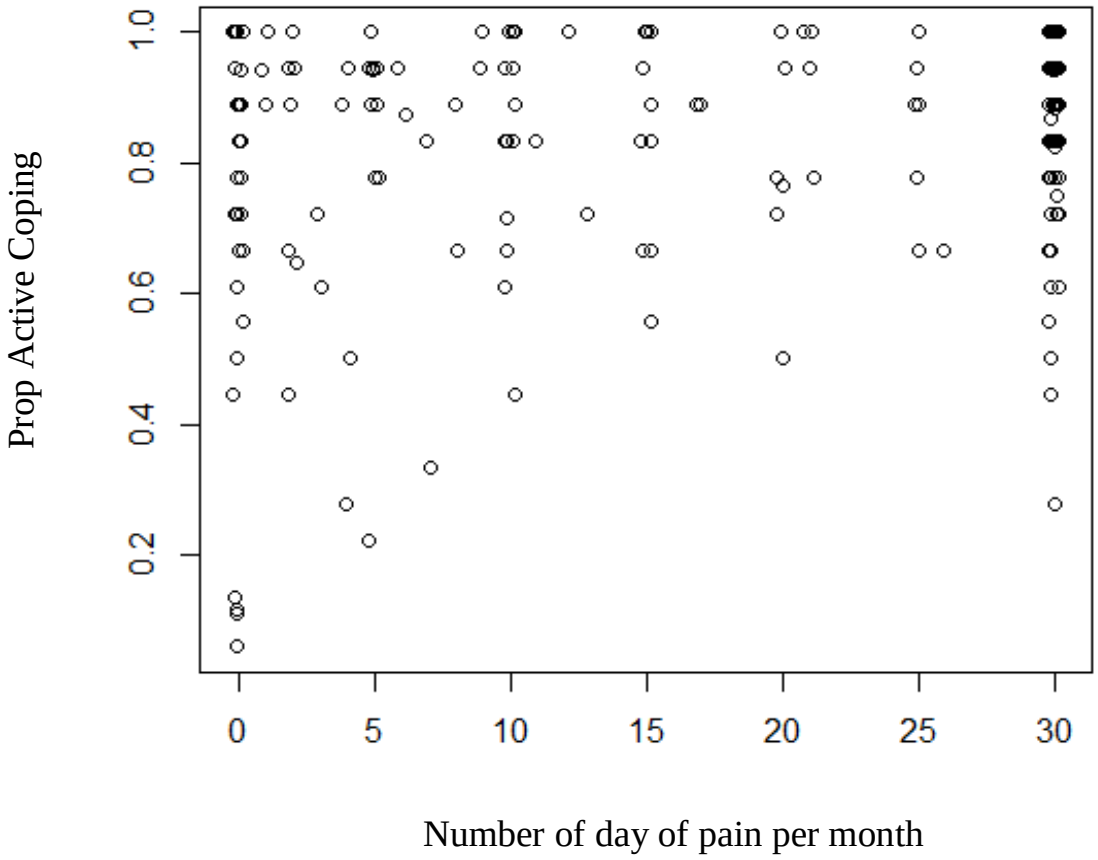

Figure 1. *Depiction of the predicted probability that utilizing active coping strategies increases as pain level increases.*

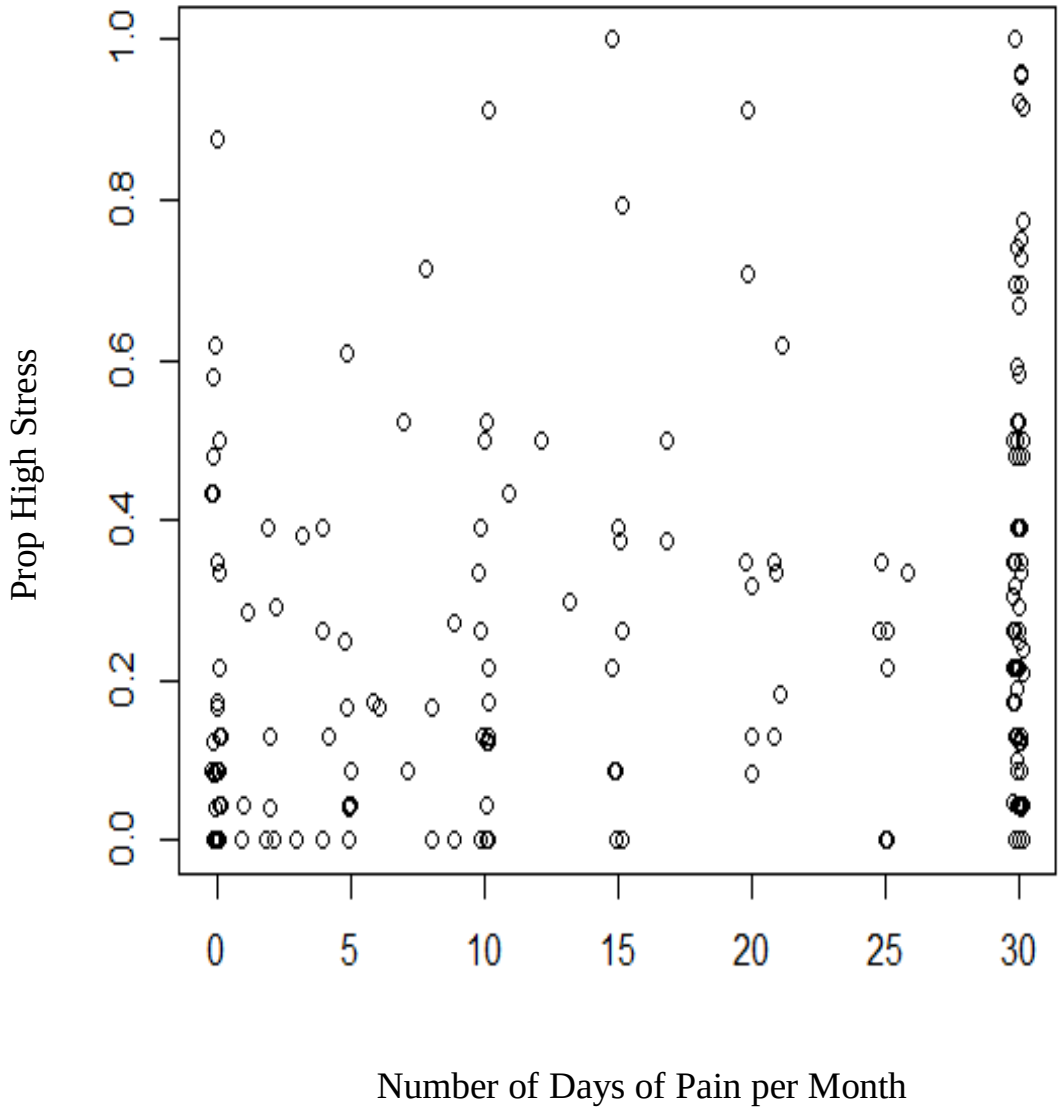

Figure 2. *Depiction of probability of being classified as high stress when pain is present.*

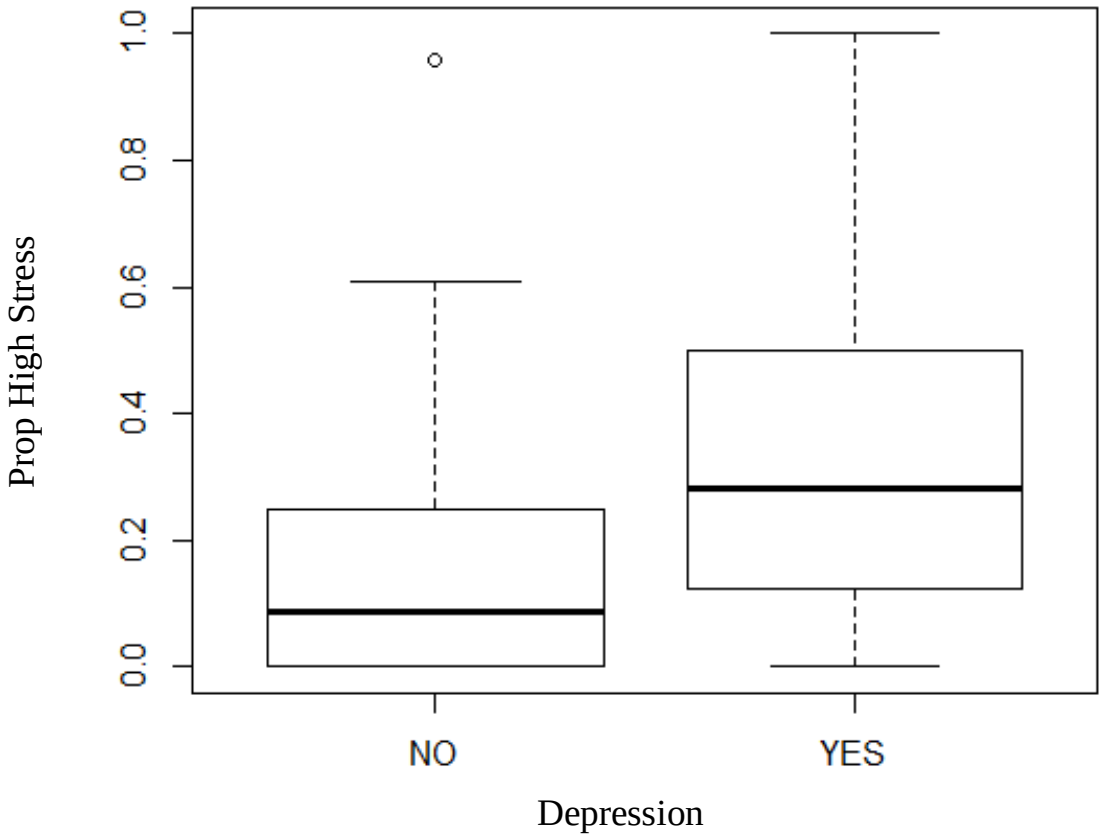

Figure 3. *Depiction of the predicted probability of being classified as high stress when depression is present.*

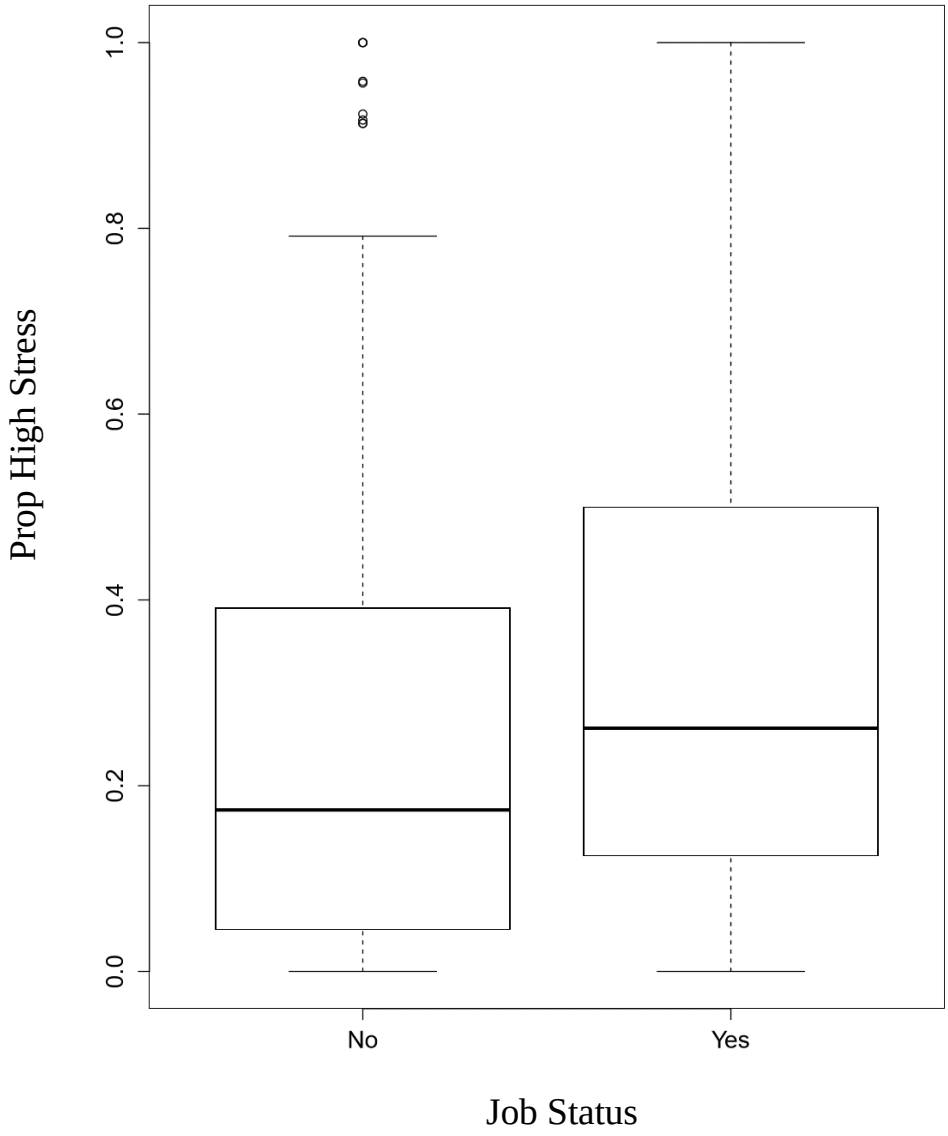

Figure 4. *Depiction of predicted probability of being classified as high stress if employed in the community at a paid job.*

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Appendix A

The Coping Response Inventory

Participants were asked to think of problems related to meeting their health care needs and how they were most likely to react to the problem. The participants answered each of the following questions with these choices: never, rarely, sometimes, and often.

When you think about a problem that you had with healthcare…

1) Did you think of different ways to deal with the problem?
2) Did you tell yourself things to make yourself feel better?
3) Did you talk to a family member about your problem?
4) Did you make a plan of action and follow it?
5) Did you try to step back from the situation so that you could look at it in a clear way?
6) Did you talk to a friend about the problem?
7) Did you know what had to be done and try hard to make things work?
8) Did you think about what you would say or do?
9) Did you try to see something positive in the situation?
10) Did you talk with a professional about the problem? (e.g., health care coordinator, physician, nurse)
11) Did you try and anticipate how things would turn out?
12) Did you seek help from persons or groups with the same type of problem?
13) Did you try at least two different ways to solve the problem?
14) Did you try to tell yourself that things could get better?
15) Did you try to find out more about the situation?

16) Did you try to learn more things on your own?

17) Did you look for guidance/and or strength?

18) Did you take things one day at a time and/or one step at a time?

Note: The Coping Response Inventory used was the Adult (CRI-Adult: Moos, 1992).

Appendix B

The Healthcare Stress Inventory

Participants were told to think of the degree of stress resulting from their health conditions, as well as their need for health care services. They were asked to respond to the following statements with one of these answer choices: never, rarely, sometimes, or often.

1) I worry about not being able to get to my doctor/treatment appointments.
2) When I talk to my health care professionals, I am afraid I won't get the answers I need.
3) I worry that the treatments recommended by my health care professionals won't help me.
4) When I go to the doctor/treatment appointments, I worry that the health care professionals won't spend enough time with me to understand my concerns.
5) I worry about being hospitalized or spending time in a nursing home.
6) I am afraid that my health care professionals won't offer me choices about my treatment.
7) I worry about not having anyone to help me explain my concerns when I see my health care provider.
8) I feel stressed after I see my health care provider.
9) I am afraid that my health care providers will not respect my decisions and choice about treatment(s).

10) I worry that the treatments health care professionals want me to follow will have bad side effects.
11) I worry about not being able to reach my health care professionals when I need answers about my conditions or treatments.
12) I am worried that my health care professionals will not take all my complaints seriously.
13) I worry that my health care professional will not be able to see me in a timely manner.
14) I am worried that my health care or treatment needs will force me to quit my job, volunteer work, and/or regularly scheduled events, or make me reduce my hours.
15) I worry about not staying eligible for the health care services and supports I need.
16) I worry that my benefits will not allow me to get the supports that I really need.
17) I worry about not being able to reach people to discuss coverage of my health care services and benefits.
18) I worry because it takes a long time for me to get the answers I need about my health care (e.g., whether I am eligible for a support or service).
19) I worry because it takes a long time for me to get approval or permission for the health care supports I need.
20) I worry because I don't have people to support me in completing the paperwork I need to complete to get the benefits I need.
21) I worry that treatment of my disability will have a negative impact on my family.
22) I worry that I will not be able to fulfill my family responsibilities because of my health care treatment.

23) I am concerned that health care professionals will listen to my family members more than me when making decisions about my treatment.

24) I am afraid that if my condition changes, I will not be able to get the increased supports I need to continue living where I am now.

Note: The Health Care Stress Inventory used was adapted from the Disability and Chronic Illness-Related Stress Inventory (DCIRSI: Leung, Lue, Tang, & Wu, 1999).